

Reconocimiento de Patrones

Version 2021-2

Feature Selection SFS - Sequential Forward Selection

[Capítulo 3]

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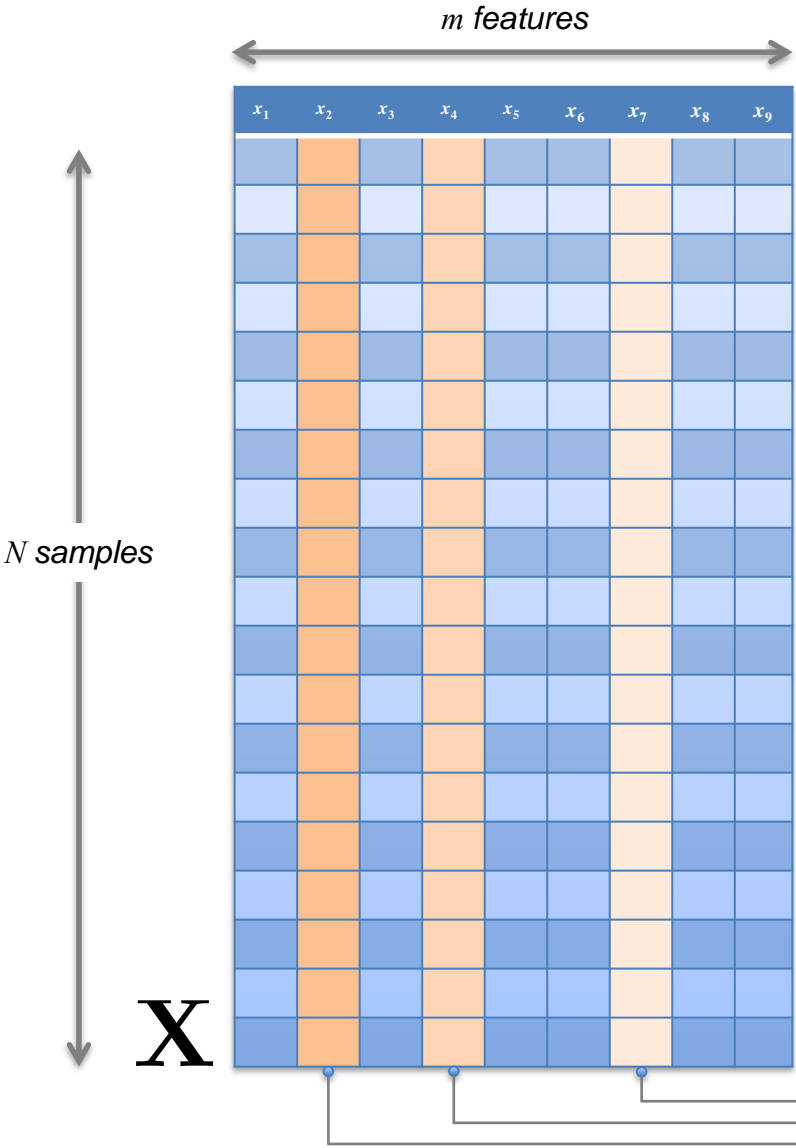
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Universidad Popular del Cesar

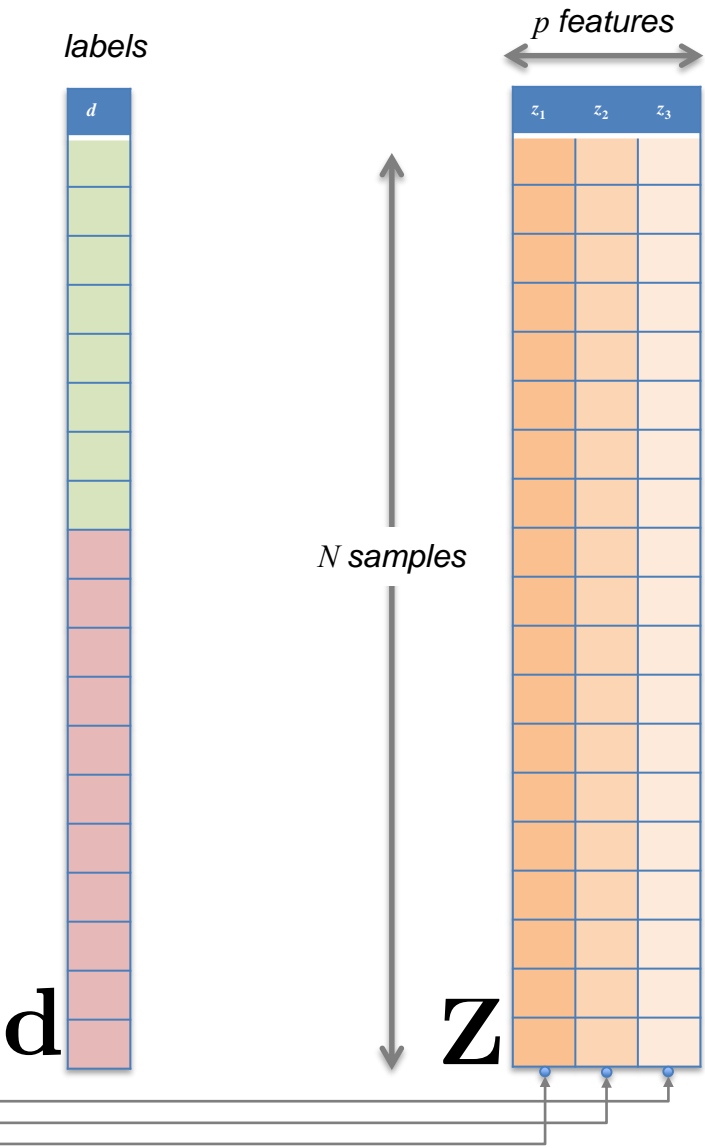
Example:

From 9 features, select 3

Extracted features



Selected features



$J_{\max} = 0$

1 2 3 4 5 6 7 8 9

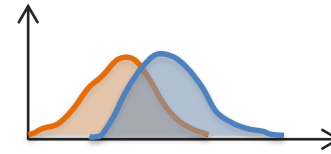
score

J

0.75

$J > J_{\max} ?$

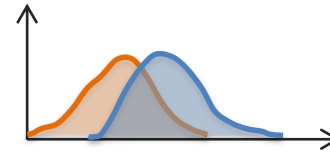
yes



$J_{\max} = 0.75$



score

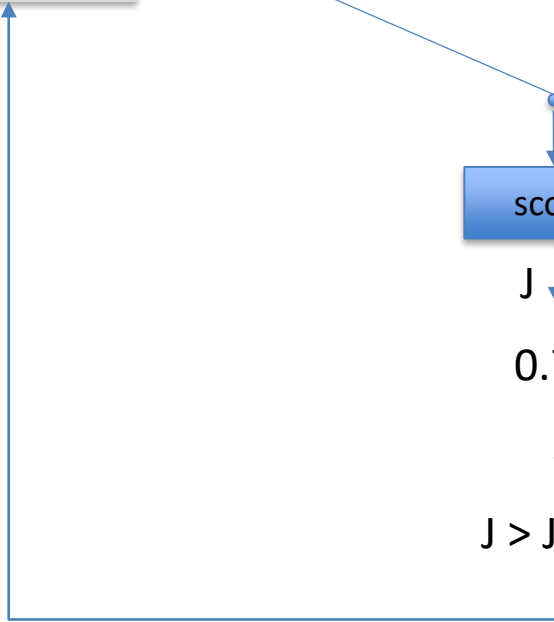


J

0.75

$J > J_{\max} ?$

yes



$J_{\max} = 0.75$



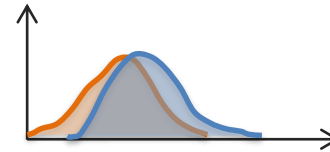
score

J

0.51

$J > J_{\max} ?$

yes



$J_{\max} = 0.75$



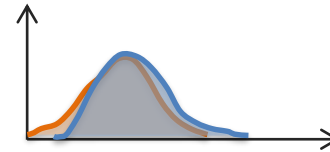
score

J

0.24

$J > J_{\max} ?$

yes



$J_{\max} = 0.75$



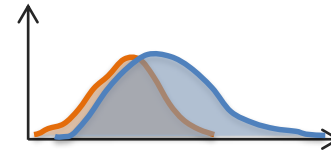
score

J

0.64

$J > J_{\max} ?$

yes



$J_{\max} = 0.93$

1 2 3 4 5 6 7 8 9

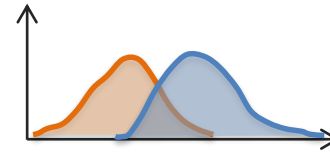
score

J

0.93

$J > J_{\max} ?$

yes



$J_{\max} = 0.93$



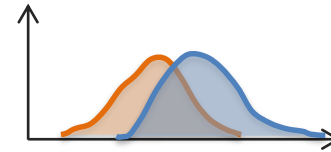
score

J

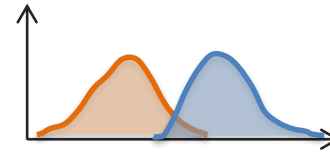
0.62

$J > J_{\max} ?$

yes



$J_{\max} = 1.47$



J

1.47

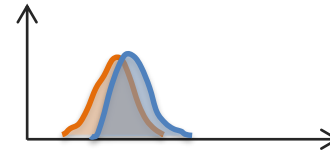
$J > J_{\max} ?$

yes

$J_{\max} = 1.47$



score



J

0.27

$J > J_{\max} ?$

yes

$J_{\max} = 1.47$



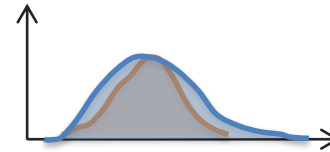
score

J

0.13

$J > J_{\max} ?$

yes



$$J_{\max} = 1.47$$

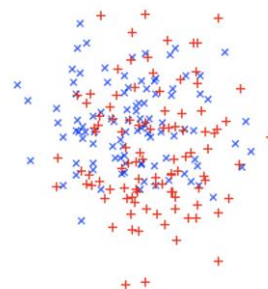


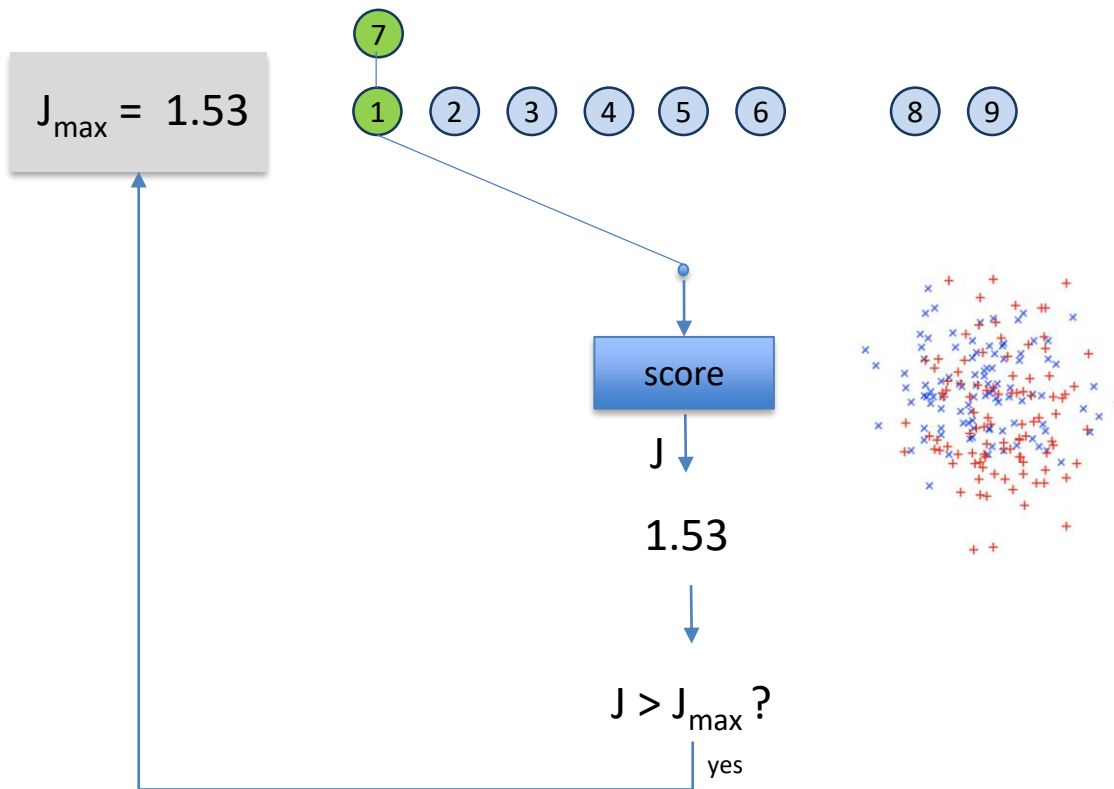
score

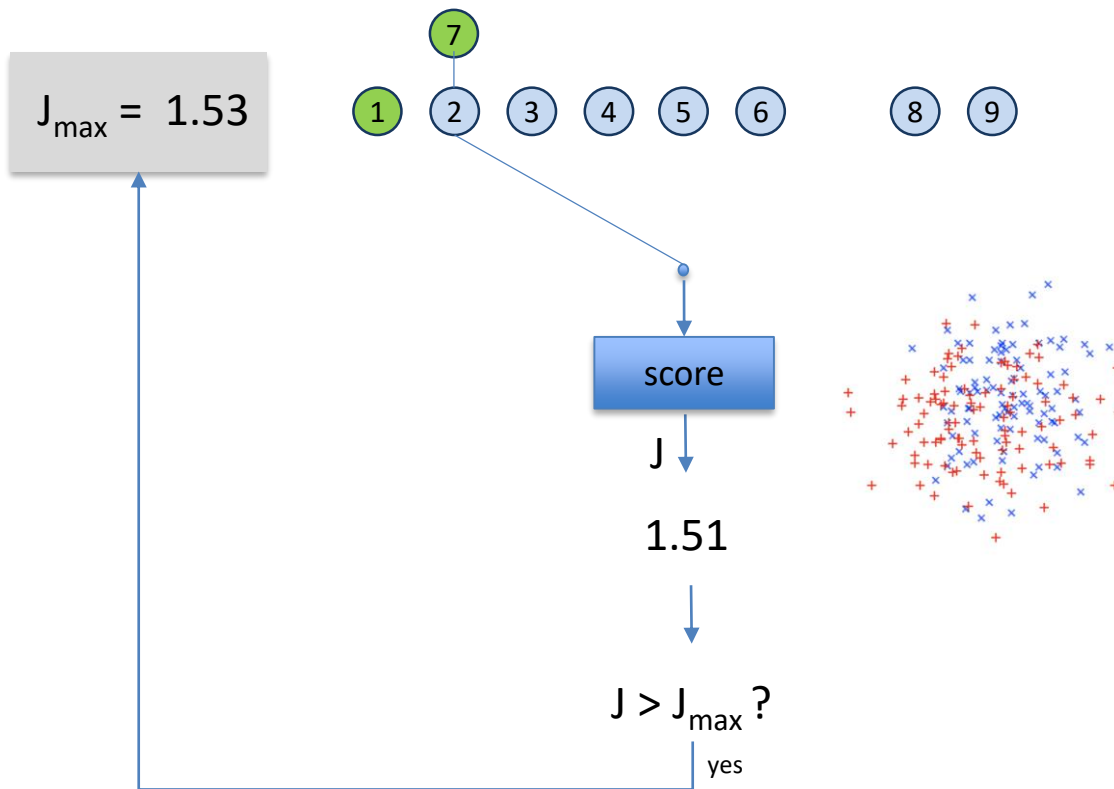
J

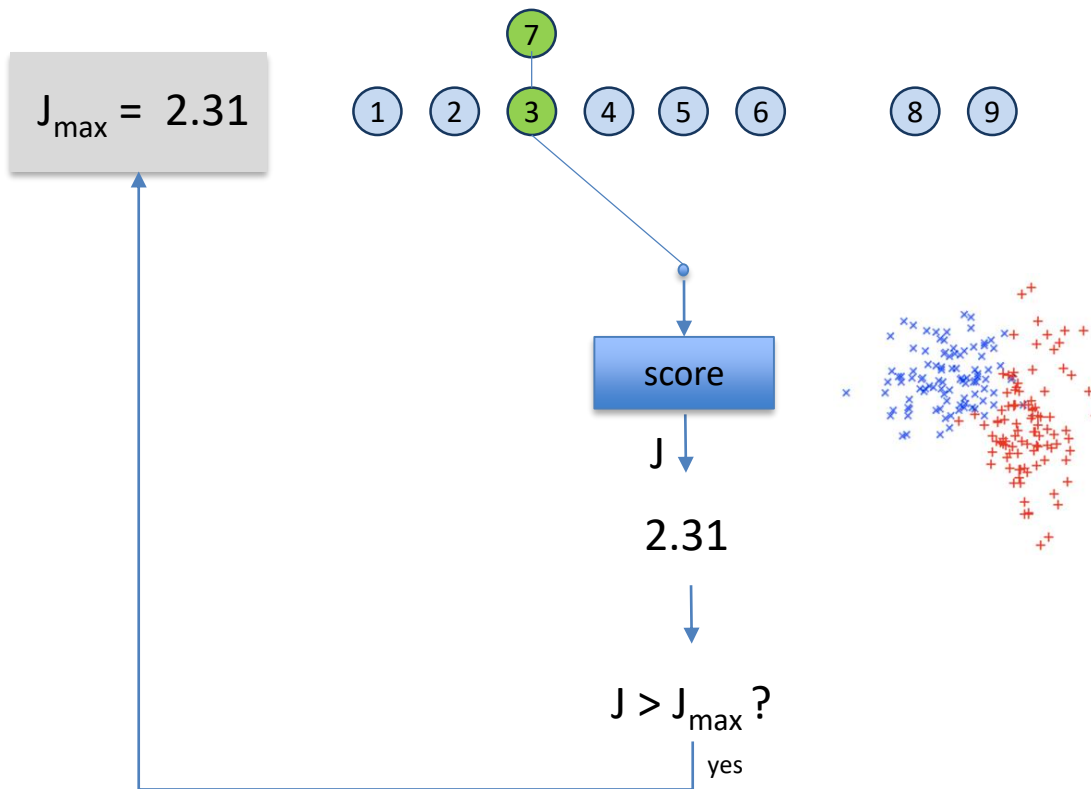
1.53

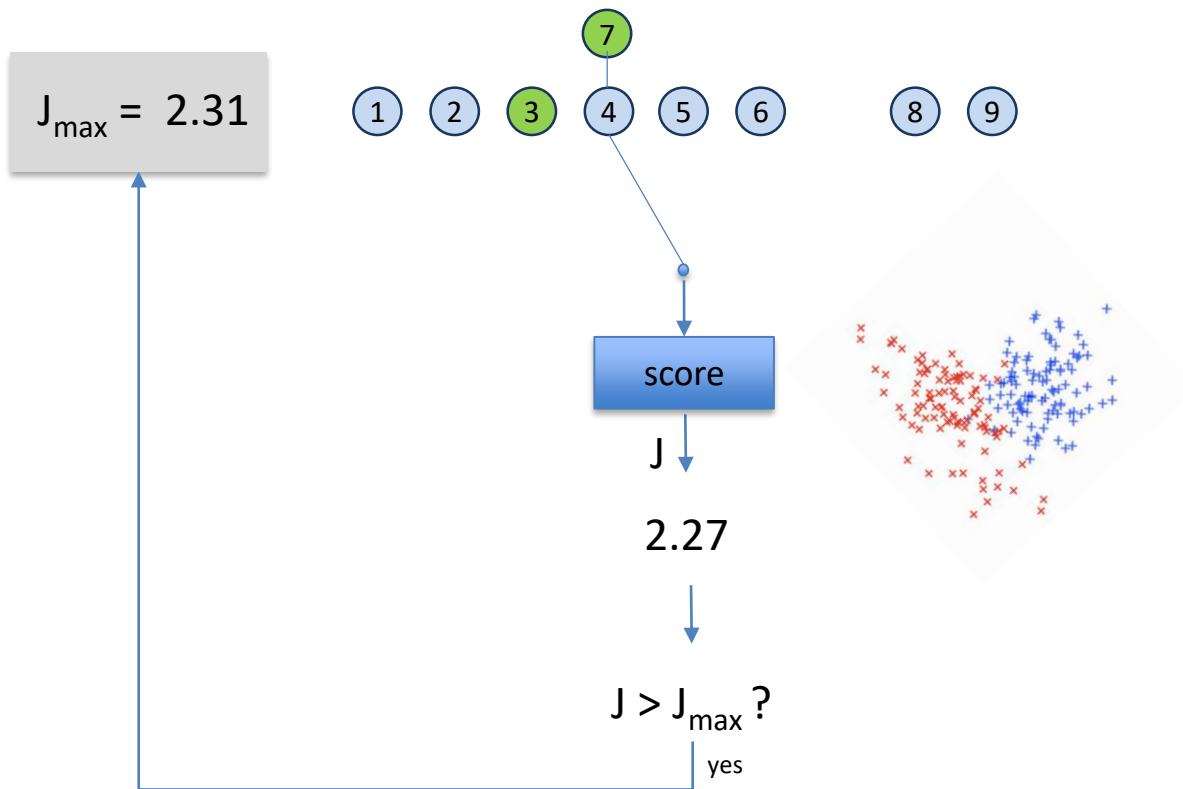
$J > J_{\max} ?$

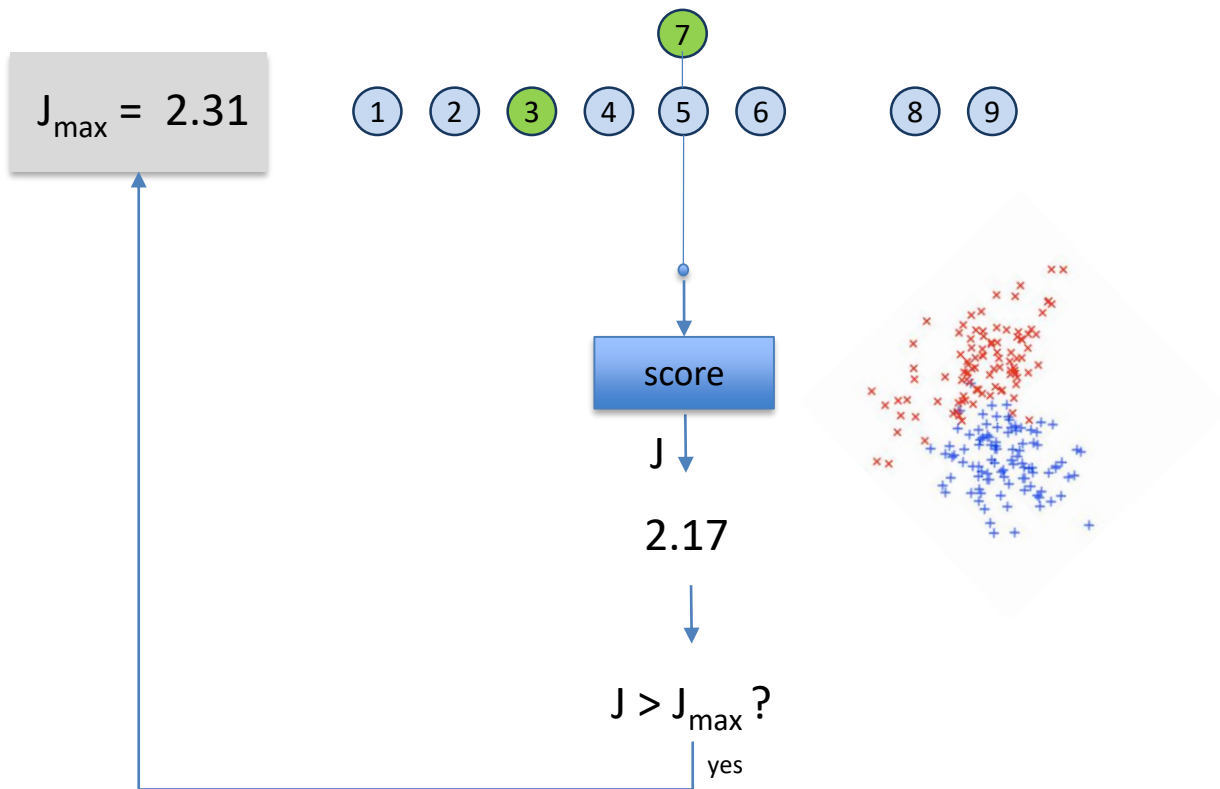


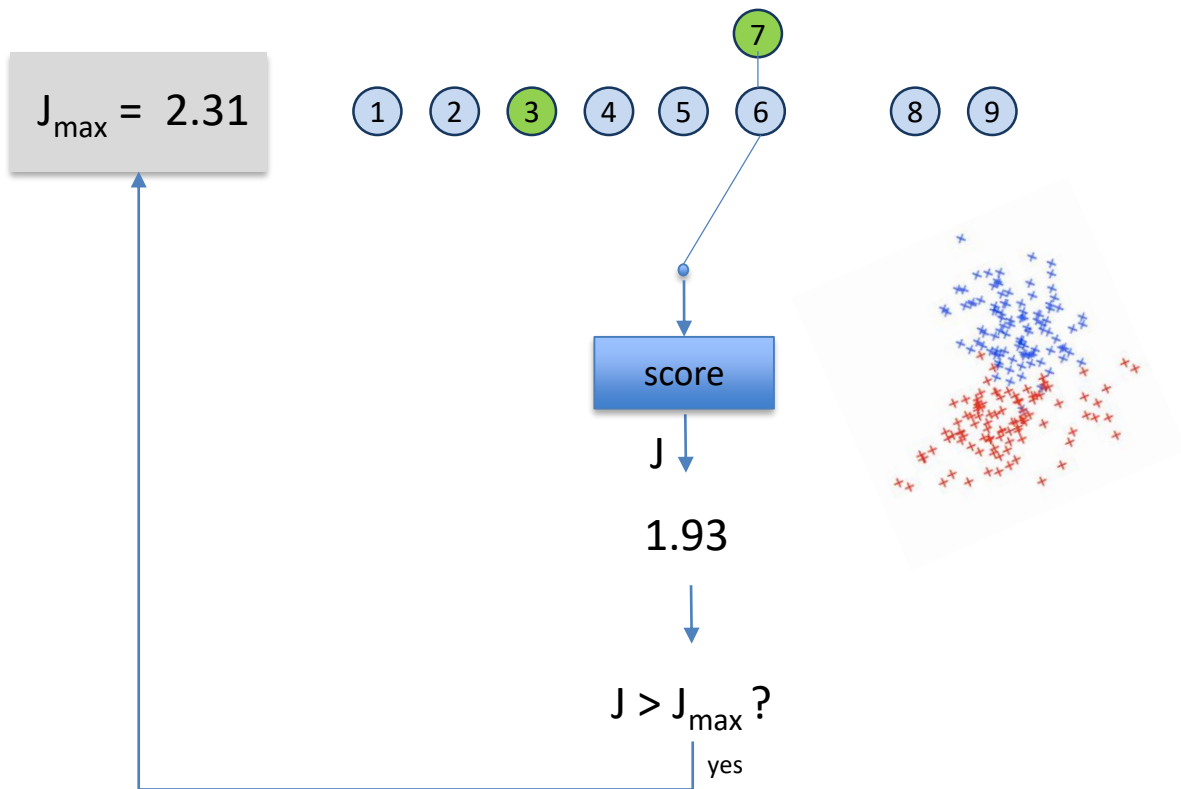


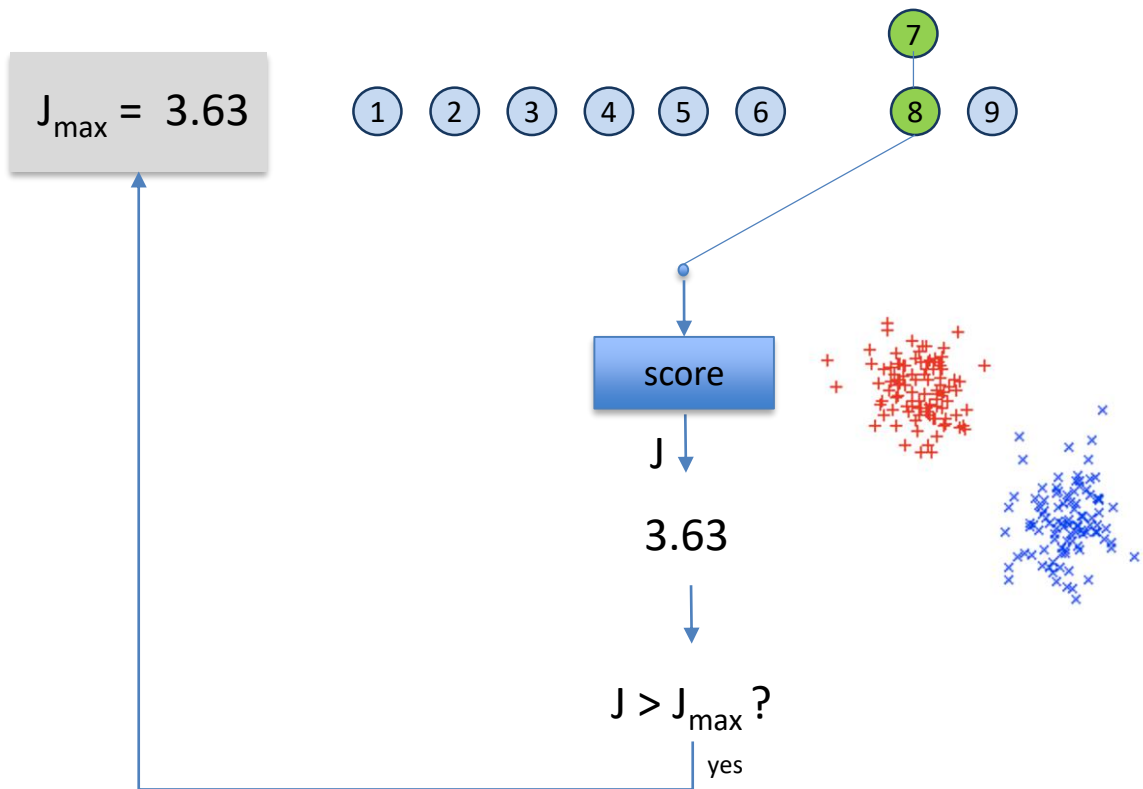


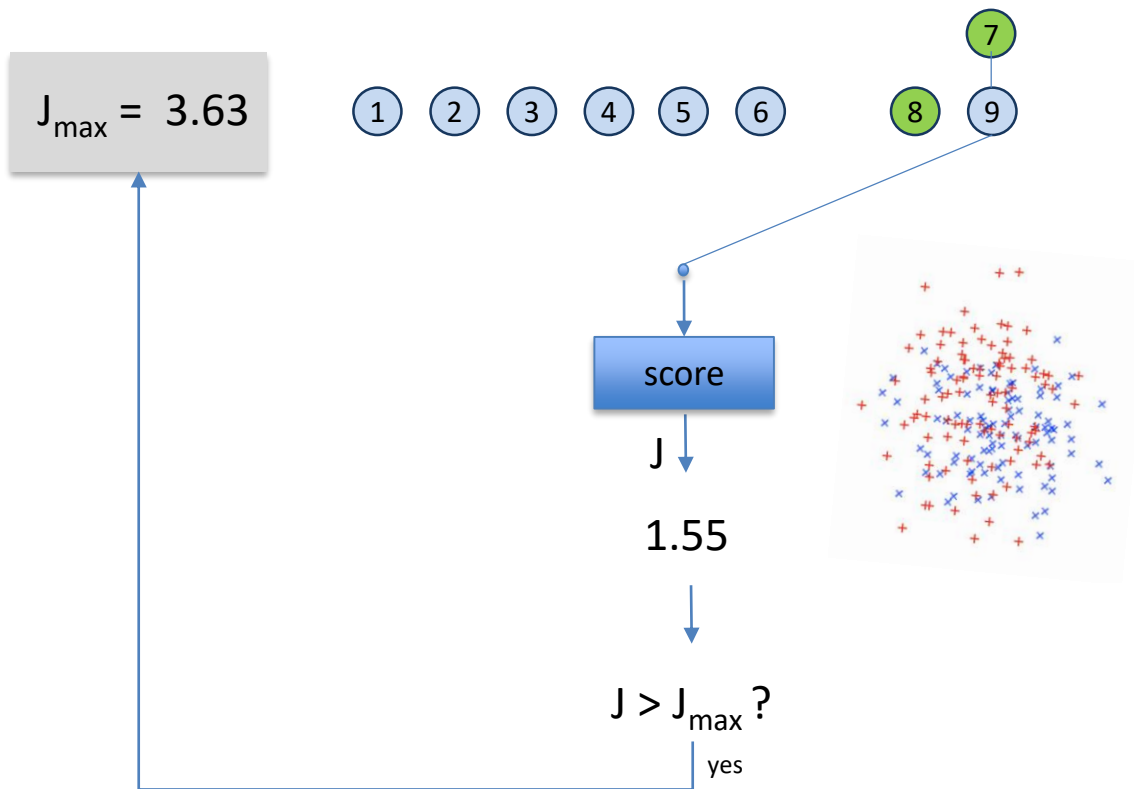




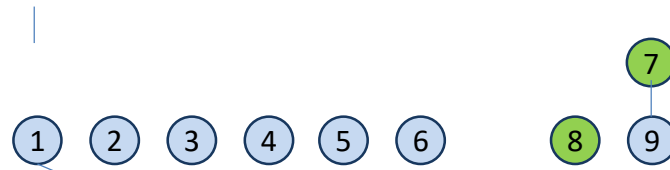








$$J_{\max} = 3.63$$

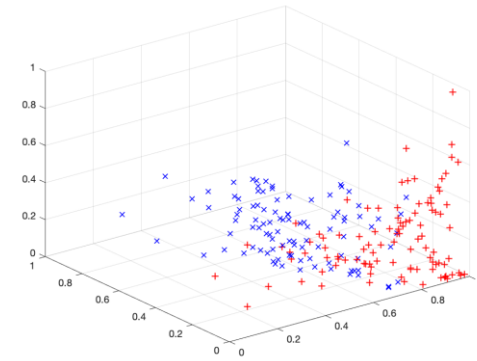


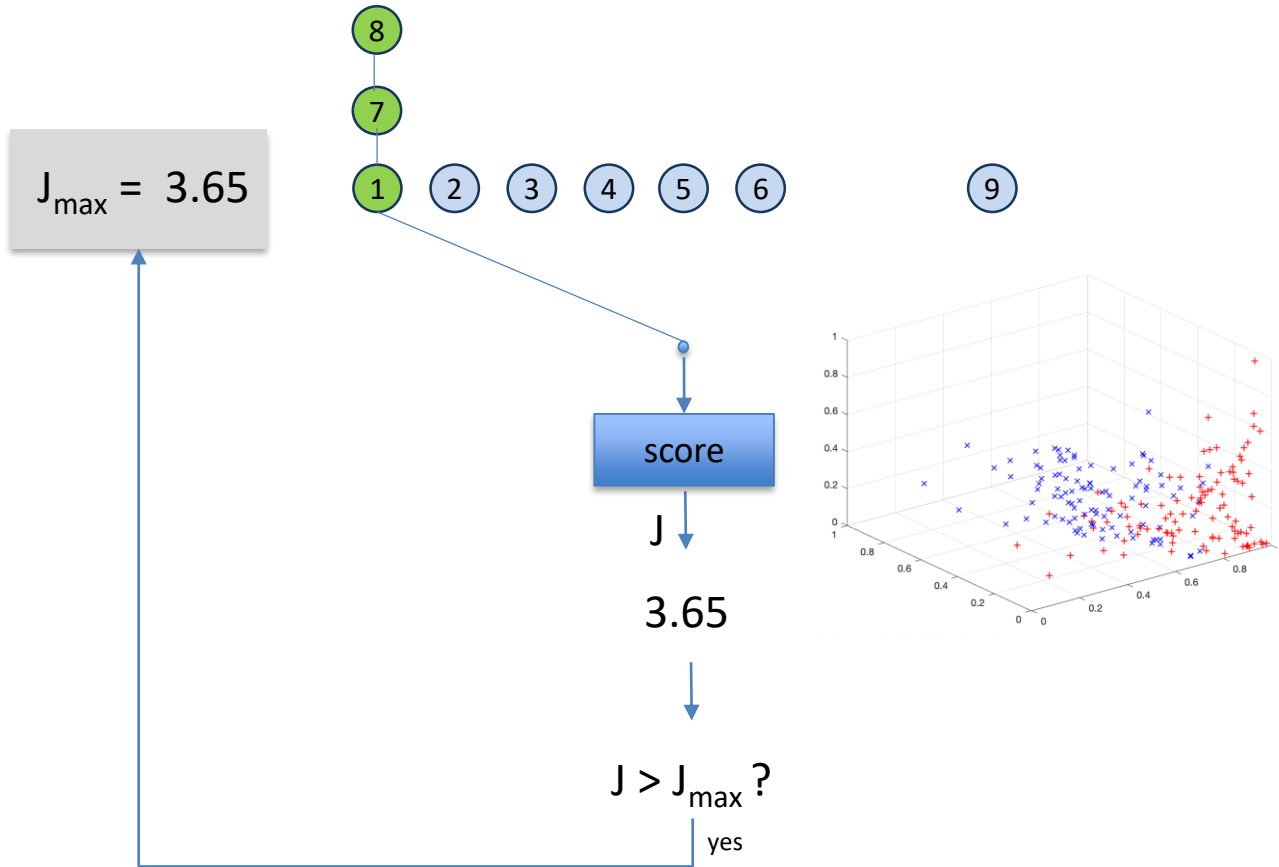
score

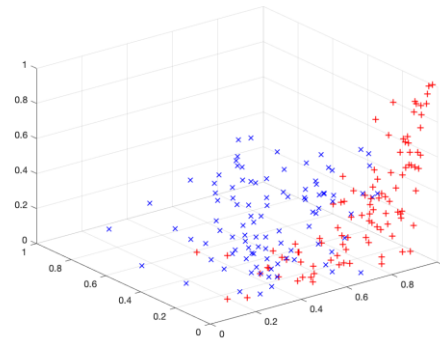
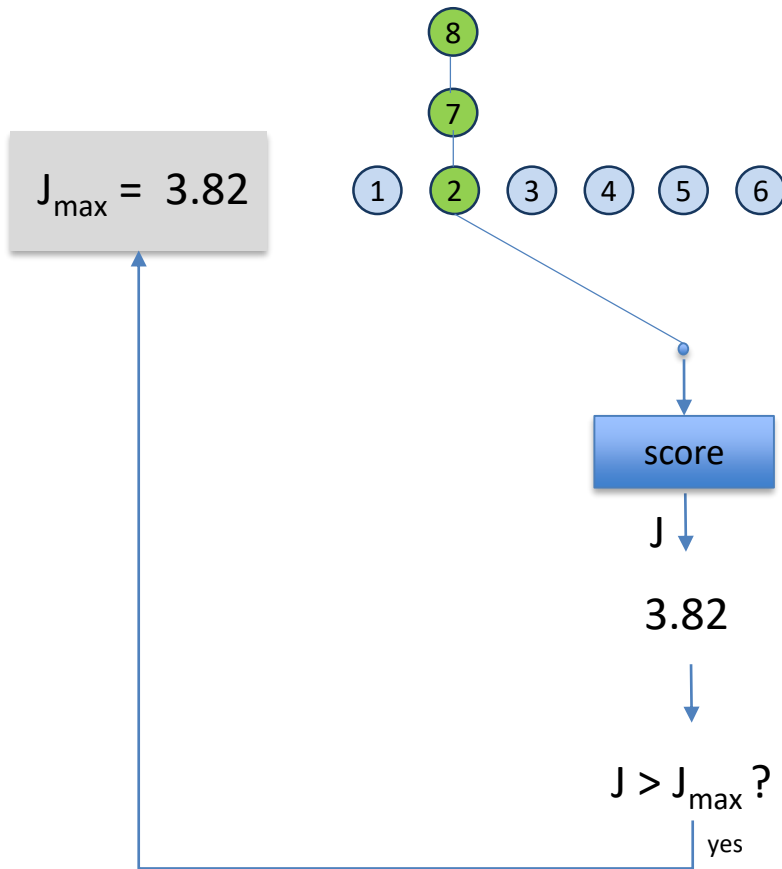
J

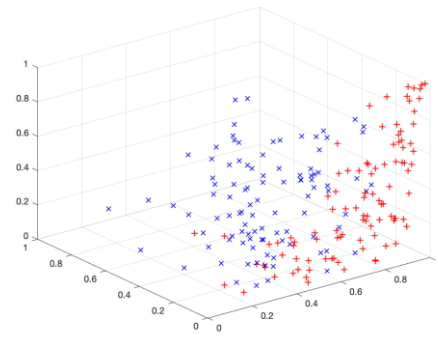
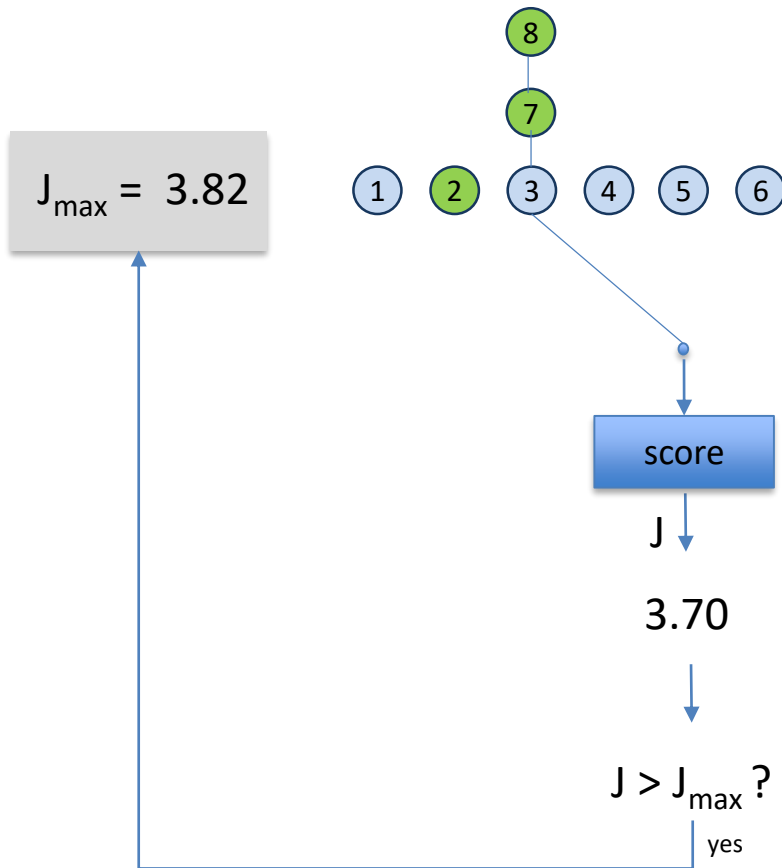
3.65

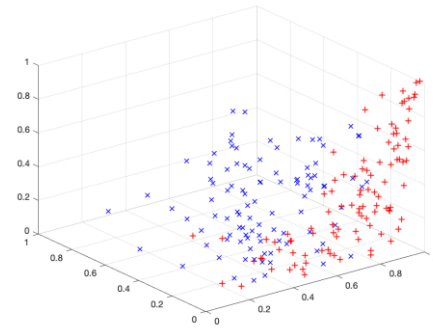
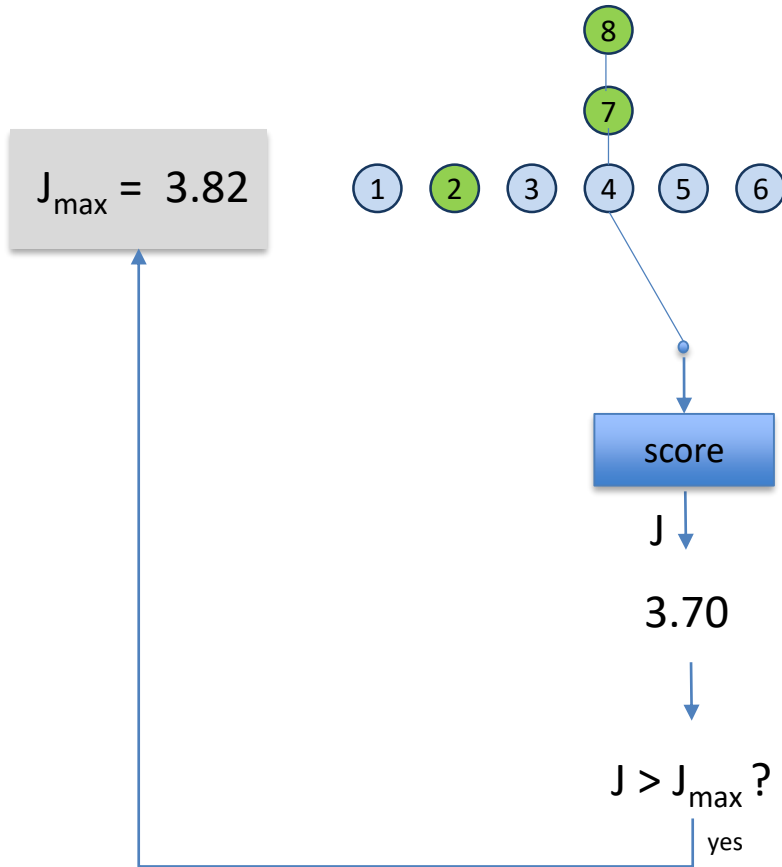
$J > J_{\max} ?$

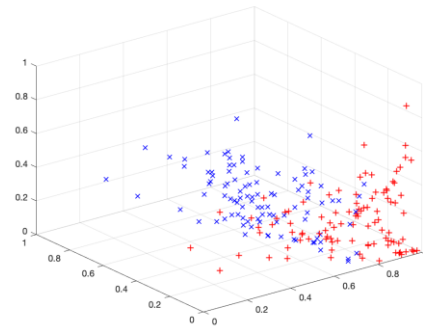
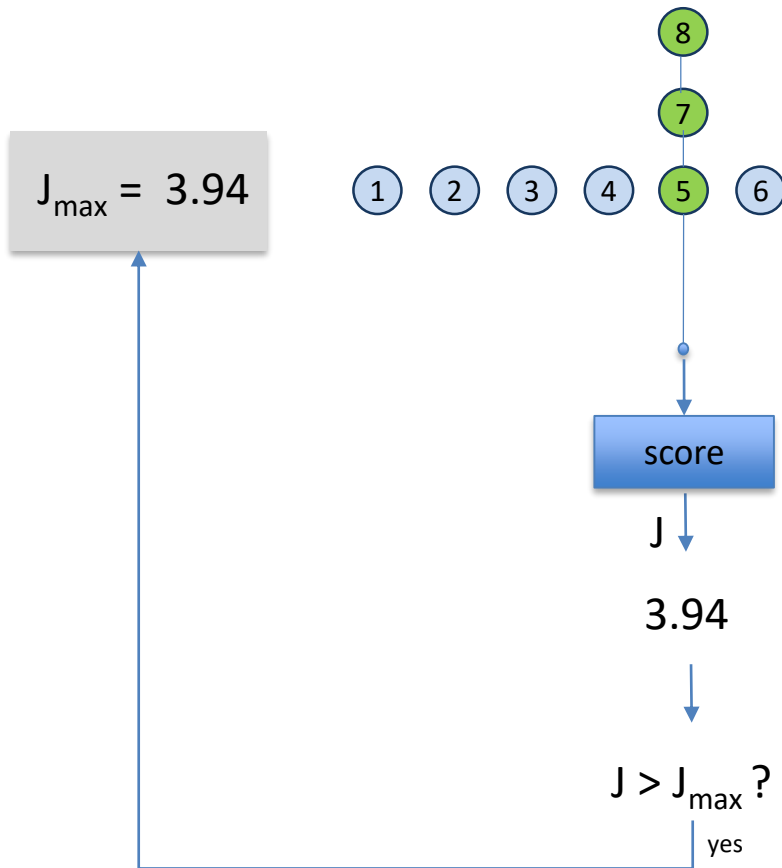


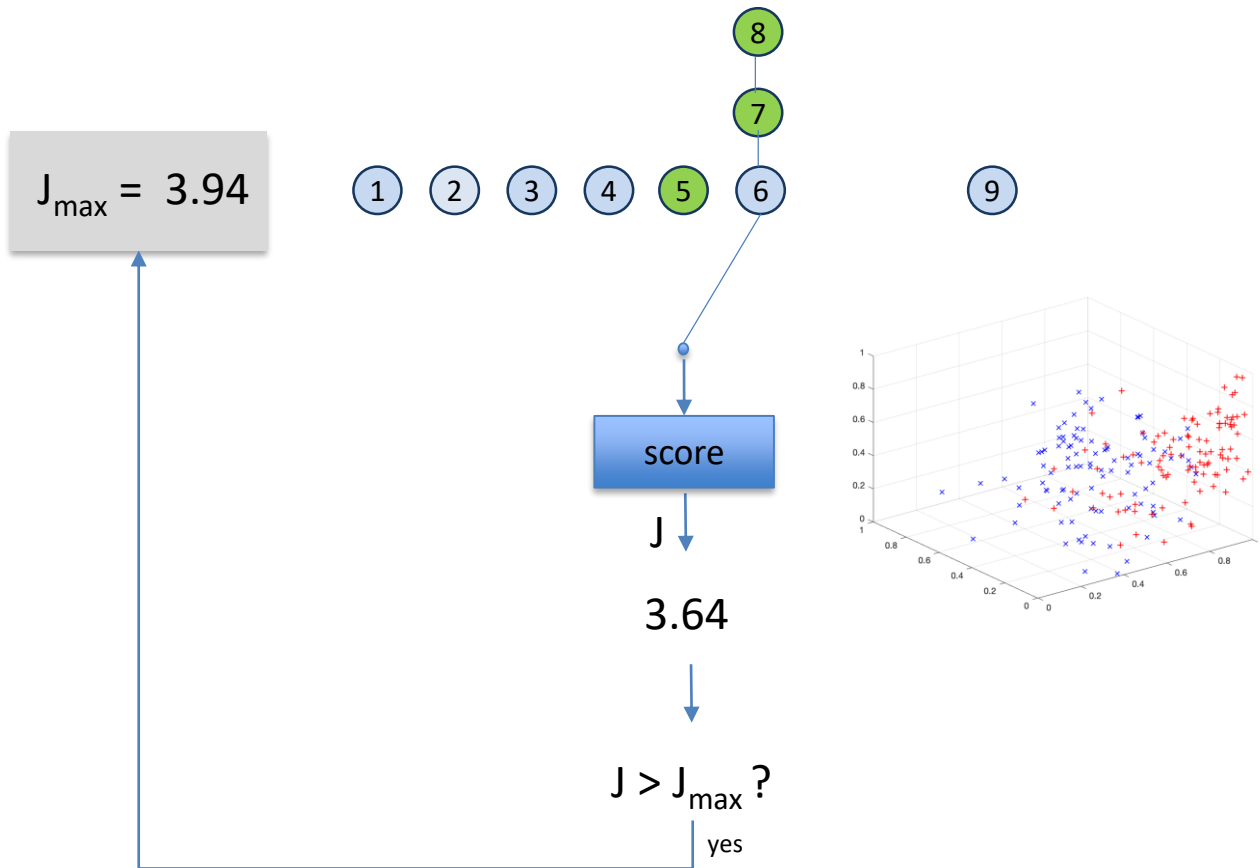


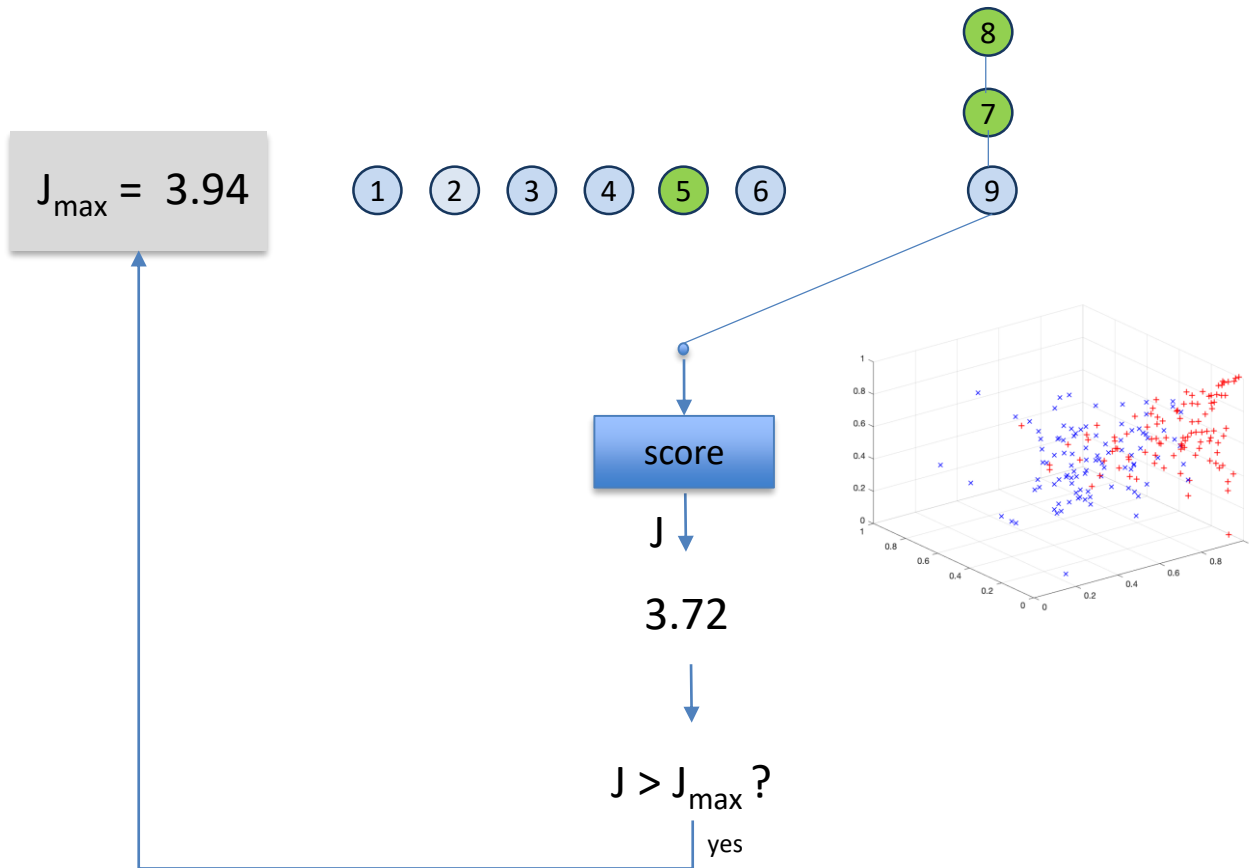




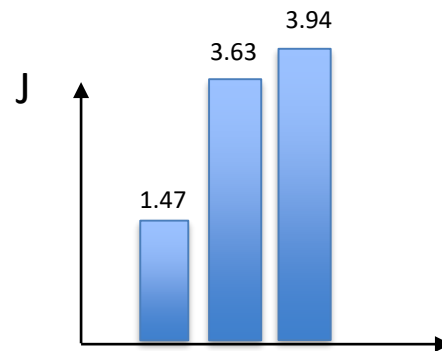








$$J_{\max} = 3.94$$



Selected Features

SFS Algorithm

```
s      = [ ]           # selected features
a      = ones(m,1)      # available features
Jmax   = 0             # initialization
for j = 1 to p          # p features to be selected
    for k = 1 to m      # X has m features
        if a(k) == 1   # is feature k available
            st = [s, k] # columns of X
            J = score(X(st)) # evaluation of the score
            if J > Jmax
                kmax = k
                Jmax = J # update maximum
            end
        end
    end
    a(kmax) = 0          # selected features in no available
    s = [s, kmax]       # update selected features
end
```